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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,897	10/12/2004	Haining Yang	FIS920040194US1	5896

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EXAMINER

THOMAS, TONIAE M

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 03/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/711,897

Applicant(s)

YANG ET AL.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-24 is/are pending in the application.
- 4a) Of the above claim(s) 8-10 and 13-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-7,11 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is responsive to the amendment filed 28 December 2005. Currently, claims 1, 2, and 4-24 are pending. Claims 8-10 and 13-24 have been withdrawn from further consideration by the examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. *Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Claim 12 recites the limitation "wherein said first configuration of insulating material comprises a compressive material and said second configuration of insulating material comprises a tensile material." It is unclear how the first configuration of insulating material can comprise a compressive material and the second configuration of insulating material comprise a tensile material, when in claim 1 it is established that the first configuration of insulating material comprises a tensile material and the second configuration of insulating material comprises a compressive material (see claim 1, lines 10-12).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. *Claims 1, 2, 5, 6, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Shimizu et al. (US 2004/0029323 A1).*

The Shimizu et al. patent (Shimizu) discloses a method for forming a CMOS device (see fig. 4 and accompanying text). The method comprises: forming a first configuration 13, 13A of insulating material over a first group of the CMOS devices, wherein the first group of CMOS devices comprise NFET devices [fig. 4(b) and par. 0096 - par. 0097]; and forming a second configuration 14 of insulating material over a second group of the CMOS devices, wherein the second group of CMOS devices comprise PFET devices [fig. 4(c) and par. 0099]; wherein the first and the second configurations of insulating material are formed subsequent to a silicidation of the CMOS devices to form silicide layers 12 [fig. 4(a) and par. 0095] and prior to formation of a first interlevel (ILD) dielectric material 15 over the CMOS devices [fig. 4(d) and par. 0101], and wherein the first configuration of insulating material

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comprises a tensile layer 13 over the NFET devices [par. 0098, lines 8-10] and the second configuration of insulating material comprises a compressive layer 14 over the PFET devices [par. 0100, lines 5-8].

The first configuration of insulating material further comprises a pair of individual insulating layers 13, 13A [fig. 4(b) and par. 0096 - par. 0097], and the second configuration 14 of insulating material further comprises a single insulating layer 14 [fig. 4(c) and par. 0099].

The pair of individual insulating layers further comprises a first nitride layer 13 and an oxide layer 13A [fig. 4(b) and par. 0096 - par. 0097], and the single insulating layer further comprises a second nitride layer 14 [fig. 4(c) and par. 0099].

The first nitride layer 13 is a tensile nitride layer [par. 0098, lines 8-10], and the second nitride layer 14 is a compressive nitride layer [par. 0100, lines 5-8].

The first configuration of insulating material further comprises one of a single nitride layer 13 and a single oxide layer 13A [fig. 4(b) and par. 0096 - par. 0097]; and the second configuration of insulating material further comprises a single nitride layer 14 [fig. 4(c) and par. 0099].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

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matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. *Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. in view of Ku (US 6,455,405 B1).*

Shimizu does not teach that the first group of the CMOS devices comprises gate oxide thicknesses of a first range and the second group of the CMOS devices comprises gate oxide thicknesses of a second range.

Ku discloses a method of forming a semiconductor device, wherein the device comprises a first device region 15 and a second device region 17 (figs. 1-5 and accompanying text). The first device region 15 comprises a gate oxide 30 of a first thickness range (fig. 5 and col. 2, lines 60-62), whereas the second device region 17 comprises a gate oxide 32 of a second thickness range (fig. 5 and col. 2, lines 62-64).

Shimizu and Ku are from the same field of endeavor, fabrication methods for semiconductor integrated circuit devices. Thus, the teaching for which Ku is relied upon in this action would have been recognized in the primary prior art reference to Shimizu by one of ordinary skill in the art at the time the invention was made.

Depending on the application, CMOS devices often require dual thickness gate oxide layers, wherein the CMOS devices include a first group of devices comprising gate oxides of a first thickness range and include a second group of devices comprising gate oxides of a second thickness range (e.g.

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dynamic random access memory (DRAM) devices). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Shimizu by forming the gate oxides of the first and second group of devices, as taught by Ku, because the resulting device comprises dual thickness gate oxide layers, wherein a first group of devices comprises gate oxides of a first thickness range and a second group of devices comprises gate oxides of a second thickness range.

5. *Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. in view of Mizuno et al. (2002/0197890 A1).*

Shimizu teaches that the second nitride layer 14 is deposited by plasma enhanced CVD [par. 0099] using a silane (SiH_4) precursor [par. 0089], and the oxide layer 13A is TEOS [par. 0097]. However, Shimizu does not teach that the first nitride layer 13 is depositing using a BTBAS precursor.

The Mizuno et al. application publication (Mizuno) discloses a method for depositing a silicon nitride layer, wherein the silicon nitride layer is deposited using a BTBAS precursor (par. 70, lines 1-4).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Shimizu by depositing the first nitride layer using a BTBAS, as taught by Mizuno, because BTBAS is an alternate silicon-containing precursor that can be used in place of SiH_4 , in chemical vapor deposition processes, to form silicon nitride layers.

Response to Arguments

6. Applicant's arguments with respect to claims 1 and 6 have been considered but are moot in view of the new ground(s) of rejection.
7. Claim 12 is not rejected over prior art in this Office action. However, if amended to overcome the rejection under 35 USC 112, second paragraph, as set forth above, claim 12 may then be rejected under 35 USC 102(e) as being anticipated by Shimizu.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TMT
18 March 2006



Mary Wilczewski
Primary Examiner